

WHAT IS CLAIMED AS NEW AND DESIRED TO BE PROTECTED BY
LETTERS PATENT OF THE UNITED STATES OF AMERICA, IS:

1. A tool for inserting a plurality of electrical wires into an electrical connector for mating with a plurality of electrical contact members fixedly mounted within the electrical connector, comprising:

5 a base fixture upon which an electrical connector is to be installed;

 an insertion die holder upon which a set of insertion dies is mounted for encountering and forcing the plurality of electrical wires into the electrical connector;

10 and

 a multi-chamber piston-cylinder driving assembly for developing an enhanced force level necessary for moving said insertion die holder toward said base fixture so as to cause said set of insertion dies mounted upon said insertion die holder to force the plurality of electrical wires into the electrical connector and mate with the electrical contact members of the electrical connector.

20 2. The tool as set forth in Claim 1, wherein said multi-chamber piston-cylinder driving assembly comprises:

 a cylinder housing;

25 a plurality of members dividing said cylinder housing into a plurality of piston chambers;

 a single piston rod;

 a plurality of piston members fixedly mounted upon

said single piston rod and respectively disposed within said said plurality of piston chambers;

means for conducting an actuating fluid into a first region of each one of said plurality of piston chambers disposed upon a first side of each one of said plurality of piston members so as to actuate said plurality of piston members in a first direction; and

means for exhausting fluid from a second region of each one of said plurality of piston chambers disposed upon a second side of each one of said plurality of piston members so as to permit said plurality of piston members to be moved in said first direction.

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3. The tool as set forth in Claim 2, wherein said means for conducting the actuating fluid into said first region of each one of said plurality of piston chambers comprises:

an axial bore defined within said single piston rod, and a plurality of transverse bores respectively fluidically connecting said axial bore with said plurality of piston chambers.

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4. The tool as set forth in Claim 3, wherein said means for exhausting fluid from said second region of each one of said plurality of piston chambers comprises:

a plurality of exhaust passages defined within each one of said plurality of dividing members and extending through said cylinder housing for respectively fluidically

connecting said second region of each one of said plurality of piston chambers to atmosphere.

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5. The tool as set forth in Claim 3, further comprising:

an air fitting connector mounted upon said cylinder housing for supplying actuating pneumatic air fluid into said cylinder housing; and

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a pair of two-position flow control valves mounted upon said cylinder housing both of which must be simultaneously actuated in order to supply the actuating pneumatic air fluid into said cylinder housing.

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6. A tool for inserting a plurality of electrical wires into an electrical connector for mating with a plurality of electrical contact members fixedly mounted within the electrical connector, comprising:

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a base fixture upon which an electrical connector is to be installed;

an insertion die holder upon which a set of insertion dies is mounted for encountering and forcing the plurality of electrical wires into the electrical connector;

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a piston-cylinder driving assembly, comprising a piston rod and at least one piston mounted upon said piston rod, for moving said insertion die holder toward said base fixture so as to cause said set of insertion dies mounted upon said insertion die holder to force the plurality of electrical wires into the electrical connector and mate with

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the electrical contact members of the electrical connector;
and

single quick-release/quick-lock means for releasing and mounting said insertion die holder upon said piston rod of said piston-cylinder driving assembly so as to permit different insertion die holders, having different sets of insertion dies mounted thereon, to be exchanged in a relatively rapid manner.

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7. A tool as set forth in Claim 6, wherein said single quick-release means for mounting said insertion die holder upon said piston rod of said piston-cylinder assembly, comprises:

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a key-hole shaped aperture, comprising a narrow slot entrance portion and a circular portion connected to said narrow slot entrance portion, formed within said piston rod; and

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a pin member, comprising a shaft section having a substantially circular cross-sectional configuration with flat regions formed upon side surface portions of said shaft member, rotatably mounted upon said insertion die holder between a first rotational position at which said substantially circular cross-sectional shaft section of said pin member is disposed within said circular portion of said key-hole shaped aperture whereby said insertion die holder is disposed in a **LOCKED** state upon said piston rod, and a second rotational position at which said flat regions of said pin member are aligned with said narrow slot entrance portion of said key-hole shaped aperture whereby said insertion die

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holder is disposed in a **RELEASED** state upon said piston rod.

5 8. The tool as set forth in Claim 7, wherein:

said pin member has a handle portion integrally connected to said shaft section for facilitating rotation of said pin member between said first **LOCKED** state and said second **RELEASED** state.

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9. The tool as set forth in Claim 7, wherein:

said single quick-release/quick-lock means for releasing and mounting said insertion die holder upon said piston rod of said piston-cylinder driving assembly comprises a quarter-turn fastener wherein said **LOCKED** and **RELEASED** states are disposed 90° apart.

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10. A tool for inserting a plurality of electrical wires into an electrical connector for mating with a plurality of electrical contact members fixedly mounted within the electrical connector, comprising:

a base fixture upon which an electrical connector is to be installed;

an insertion die holder upon which a set of insertion dies is mounted for encountering and forcing the plurality of electrical wires into the electrical connector;

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a driving assembly for moving said insertion die
holder toward said base fixture so as to cause said set of
insertion dies mounted upon said insertion die holder to
force the plurality of electrical wires into the electrical
5 connector and mate with the electrical contact members of
the electrical connector;

means for fixedly mounting said insertion die
holder upon said driving assembly so as to comprise an inte-
gral insertion die holder and driving assembly unit; and

10 means for permitting axial insertion of a first
end of said integral insertion die holder and driving assem-
bly unit into a first end of said base fixture and for per-
mitting angular rotation of said integral insertion die
holder and driving assembly unit with respect to said base
15 fixture such that a second end of said integral insertion
die holder and driving assembly unit engages a second end of
said base fixture so as to fixedly mount said integral in-
sertion die holder and driving assembly unit upon said base
fixture.

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11. The tool as set forth in Claim 10, wherein said means
for mounting said integral insertion die holder and driving
25 assembly unit upon said base fixture, comprises:

a first socket defined within said base fixture;
a first set screw mounted upon said base fixture
and operatively associated with said first socket;
a second socket defined within said base fixture;
30 a second set screw mounted upon said base fixture
and operatively associated with said second socket;

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a first guide rod mounted upon said integral insertion die holder and driving assembly unit and having structure incorporated thereon for permitting said first guide rod to bypass said first set screw when said first guide rod is axially inserted into said first socket and for engaging said first set screw when said integral insertion die holder and driving assembly unit is angularly rotated such that said first guide rod is axially retained within said first socket; and

a second guide rod mounted upon said integral insertion die holder and driving assembly unit and having structure incorporated thereon for engaging said second set screw when said integral insertion die holder and driving assembly unit is angularly rotated such that said second guide rod is axially retained within said first socket.

12. The tool as set forth in Claim 11, wherein:

said first guide rod comprises a flat peripheral portion for axially bypassing said first set screw, and a first annular recessed portion for operatively engaging said first set screw; and

said second guide rod comprises a second annular recessed portion for operatively engaging said second set screw.

13. The tool as set forth in Claim 12, further comprising:
a detent recess formed within said second guide

rod; and

spring-biased plunger latching means disposed within said second socket for engaging said detent recess of said second guide rod so as to latchingly retain said second
5 guide rod within said second socket at a fully angularly rotated position.

10 14. The tool as set forth in Claim 11, wherein:

said first guide rod fixedly mounted upon said integral insertion die holder and driving assembly unit, and said first socket defined within said base fixture, have first predetermined diametrical extents, and said second
15 guide rod fixedly mounted upon said integral insertion die holder and driving assembly unit, and said second socket defined within said base fixture, have second predetermined diametrical extents which are different from said first predetermined diametrical extents of said first guide rod
20 and said first socket such that said integral insertion die holder and driving assembly unit can only be mounted upon said base fixture in a single predetermined orientation.

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15. The tool as set forth in Claim 13, further comprising:

an aperture defined within said insertion die holder at a predetermined angular position; and

a tooth integrally formed upon said base fixture
30 at a predetermined angular position for insertion within said aperture defined within said insertion die holder so as

to ensure that said integral insertion die holder and driving assembly unit has been rotated to said fully angularly rotated position.

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16. A tool for inserting a plurality of electrical wires into an electrical connector for mating with a plurality of electrical contact members fixedly mounted within the electrical connector, comprising:

a base fixture upon which an electrical connector is to be installed;

an insertion die holder upon which a set of insertion dies is mounted for encountering and forcing the plurality of electrical wires into the electrical connector;

a driving assembly for moving said insertion die holder toward said base fixture so as to cause said set of insertion dies mounted upon said insertion die holder to force the plurality of electrical wires into the electrical connector and mate with the electrical contact members of the electrical connector; and

means mounted upon said base fixture for engaging said electrical connector so as to precisely locate and laterally immobilize said electrical connector upon said base fixture such that said set of insertion dies can accurately insert the electrical wires into said electrical connector.

17. The tool as set forth in Claim 16, wherein:

said means mounted upon said base fixture for en-

gaging said electrical connector so as to precisely locate and laterally immobilize said electrical connector upon said base fixture comprises a plurality of locator pins for engaging grooved sections of said electrical connector.

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18. The tool as set forth in Claim 16, wherein:

10 said means mounted upon said base fixture for engaging said electrical connector so as to precisely locate and laterally immobilize said electrical connector upon said base fixture comprises a header having a plurality of pins wherein first portions of said plurality of pins operatively engage said electrical connector.

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19. The tool as set forth in Claim 18, wherein:

20 said plurality of pins of said header comprise second portions for electrical connection to testing equipment by means of which the proper electrical connection between the electrical wires and said electrical contact members of said electrical connector can be verified.

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20. The tool as set forth in Claim 16, further comprising:

30 a retainer mounted upon said insertion die holder for engaging and retaining said electrical connector upon said base fixture while said set of insertion dies are being moved toward said electrical connector during insertion of

the electrical wires into said electrical connector, and for
engaging and retaining said electrical connector upon said
base fixture while said set of insertion dies are being mov-
ed away from said electrical connector after said set of in-
5 sersion dies have inserted the electrical wires into said
electrical connector.

10 21. A tool for inserting a plurality of electrical wires in-
to an electrical connector for mating with a plurality of
electrical contact members fixedly mounted within the elec-
trical connector, comprising:

15 a base fixture upon which an electrical connector
is to be installed;

an insertion die holder upon which a set of inser-
tion dies and a cutter die are mounted for encountering and
forcing the plurality of electrical wires into the electri-
cal connector;

20 a driving assembly for moving said insertion die
holder toward said base fixture so as to cause said set of
insertion dies mounted upon said insertion die holder to
force the plurality of electrical wires into the electrical
connector and mate with the electrical contact members of
25 the electrical connector; and

cutter means movably mounted upon said base fix-
ture for permitting said electrical connector to be mounted
upon and removed from said base fixture and for operatively
cooperating with said cutter die for severing the electrical
30 wires when an end-type electrical connector is being fabri-
cated.

22. The tool as set forth in Claim 21, further comprising:
trunnion means pivotally mounting said cutter
means upon said base fixture.

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23. The tool as set forth in Claim 21, wherein:

said cutter means comprises a cutter blade element
comprising a substantially arcuate cut-out section for per-
mitting the discharge of severed pieces of the electrical
wires so as to prevent the accumulation of severed pieces of
the electrical wires and jamming of said tool.

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24. The tool as set forth in Claim 23, further comprising:
a cutter blade holder fixedly mounted upon said
base fixture; and

spring biasing means interposed between said cut-
ter blade holder and said cutter blade element for normally
biasing said cutter blade element toward said operatively
cooperative position with respect to said cutter die.

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